DOCUMENT RESUME

ED 136 691 HE 008 747

AUTHOR Witmer, David R.
TITLE Is the Productivity of Colleges Declining?
PUB DATE 13 Sep 76
NOTE 17p.; Paper presented at the Third General Conference on Institutional Management in Higher Education, of the Organization for Economic Cooperation and Development (Paris, September 13, 1976).

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS Costs; Economic Factors; *Educational Benefits; *Educational Economics; Females; *Futures (of Society); *Higher Education; Investment; Males; *Prediction; *Productivity; Rewards; Social Factors; Statistical Analysis; Statistical Data; Tables (Data)

ABSTRACT

The rate of return on the student's investment in college is the measure of productivity which relates the costs of resources expended in instruction to the values of benefits produced by instruction. Costs, which are concentrated in a brief span of years in early adulthood, and the stream of benefits, which is spread over most of the remainder of a lifetime, are combined in the computation of the internal rate of return. Rate of return computations address one of two issues. The first issue is the economic payoff realized by persons making individual investments in college education. It is concluded that productivity of American college education has not declined appreciably since 1969, and is not now declining; however, it is anticipated that it will decline in the near future and then recover and increase by the year 2000. (Author/MSE)

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David R. Witmer

The University of Wisconsin-La Crosse

La Crosse, Wisconsin 54601

This paper was presented at
the Third General Conference
on Institutional Management in
Higher Education, of
the Centre for Educational Research
and Innovation, of
the ORGANISATION FOR ECONOMIC
CO-OPERATION AND DEVELOPMENT
on 13 September 1976, at
2 rue ANDRE PASCAL
75775 PARIS CEDEX 16-

The views expressed are those of the author and do not commit either the Organisation or the national authorities concerned.

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David R. Witmer
The University of Wisconsin
La Crosse, Wisconsin

1. Introduction

Has the productivity of colleges been declining? Is it declining? Will it decline during the twenty-five years ahead? Some scholars think so!

Richard B. Freeman and J. Herbert Hollomon think that the "golden age of higher education came to an abrupt end at the outset of the 1970s (1975: 24)." Claiming that the job market for college graduates was exceptionally strong during the 1950s and 1960s, they see the 25 year boom in the college job market withering into a major market bust. "By all relevant measures," they say, "the economic status of college graduates is deteriorating, with employment prospects for the young declining exceptionally sharply. As a result of the decline in relative incomes and starting salaries and in the face of continued increases in tuition and fees, the rate of return on the college investment has fallen significantly (page 25). Analysis of the causes of the seventies' turnaround suggests that the market developments represent a major break with the past and are not simply cyclical or temporary phenomena (page 27). If the proportion of the young that elects higher education does not, for whatever reason, change in the expected manner, the depressed market is likely to last throughout the 1980s (page 29)."

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* To be published in a forthcoming issue of Change, the Magazine of Higher Learning, NBW Tower, New Rochelle, N.Y. 10801 U.S.A.

Calculating the discounted difference in earnings of college compared with high school educated workers, Stanley D. Nollen (1974) finds that the supply of college educated white males has increased rapidly because the market benefit from college education has increased faster than the cost. Assuming that young men are responsive to the relationships of benefits and costs, he thinks the current narrowing earnings gap for persons 25-34 years old could mean downward pressure on future enrollments. Lewis B. Mayhew (1974) believes the economic value of investment in college education decreased in the early 1970s, is still decreasing, and, for this and other reasons, higher education has become a declining industry. Stephen P. Dresch (1974) predicts the economic incentives to go to college will remain low causing undergraduate enrollments to decrease 30 percent below 1974 levels by the year 2000.

Elias Blake, Jr., and other members of the Board of Trustees of the Carnegie Foundation for the Advancement of Teaching see "fast declining rates of pay for college graduates as compared with high school graduates (1975: 5), sharply rising costs of college attendance that have been associated with accelerated inflation rates and accompanying increases in tuition and other college charges (page 31), and declining rates of return on investment in a college education (page 47)." Claiming that, since 1930, colleges "paid higher salaries to faculty members and met other higher costs but did not raise their productivity," they believe "the price of higher education rose more rapidly than prices generally, that it is reasonable to expect that all such increases in costs cannot be passed through to sources of income in the future and will need to be offset, in part, by productivity increases; that real resources are unlikely to rise by more than 1.5 percent per year, thus requiring almost a

one percent gain in productivity per year. This will be hard to achieve over the long run (pages 100 and 102)."

2. Measuring productivity

The rate of return on the college investment, which is the main concern of the scholars cited above, is the measure of productivity which relates the costs of resources expended in instruction to the values of benefits produced by instruction. In this measure, costs, which are concentrated in a brief span of years in early adulthood, and the stream of benefits, which is spread over most of the remainder of a lifetime, are combined in computation of the internal rate of return. In this computation, benefits in the form of additional earnings of college graduates over those of high school graduates are discounted to recognize that far-distant benefits are valued less highly than benefits just a few years in the future.

Rate of return computations address one of two issues: The first is the economic payoff realized by persons making individual investments in college education. This private rate of return computation summarizes present costs and future benefits from a personal perspective. The costs are the costs which college students face: earnings foregone, tuition, books, etc. The benefits are equal to the extra, after income tax, earnings realized by individual college graduates over what they would have earned with less schooling. The second issue is the economic payoff realized by society as a whole as a result of making investments in college education. This social rate of return is based not only on the costs borne by private persons pursuing college education but also on the subsidies provided by taxpayers through property tax exemptions, student financial aids, direct appropriations of operating funds, etc. The social benefits are equal to the extra, before income tax, earnings of college graduates

over those of high school graduates of equal academic aptitude who did not go on to college.

The computations reported in Figures 1 and 2 are social rates of return on investments in college education in all institutions of higher education in the United States, privately and publicly controlled. College instructional resources, such as faculty and supporting staff effort, supplies, services, and equipment, are valued at actual purchase cost. Physical plant capital is valued at the cost of debt service on bonds in the amount equivalent to the share of higher education plant devoted to instruction. Property and sales tax exemptions, which colleges enjoy as social subsidies, are valued at prevailing tax rates. Wages earned by students while attending college are subtracted from wages earned by other persons of the same age, ability, and previous education, to estimate earnings foregone--a measure of the value of student time and effort, and also a measure of the value of the product which society foregoes because students are in college. College related student subsistence costs are estimated by subtracting the costs of living at home from the costs of living at college, and adding the offsetting direct student financial aid subsidies provided by taxpayers. The portion of student-contributed resources expended as investment (71%) is then separated from that expended for consumption (29%), i.e., the immediate joys and pleasures which result from being in college. Finally, the cost of all this investment is divided by the total number of college students before the rate of return is computed (Witmer, 1971).

The value of investing in college education is evidenced in the productive contributions to society and in the concomitant earnings of former college students, as compared with those of high school graduates who did

not enter college. Cross-sectional data from U. S. Census Bureau reports describing earnings of groups of persons of different ages, with different levels of education, are converted to a longitudinal basis to represent the earnings experiences of groups of persons over a lifetime, and adjusted upward to reflect observed increases in the earnings of both groups due to growth in the economy. Adjustments for varying rates of mortality, morbidity, and unemployment are made. The difference in earnings which can be credited to college education (78%) is then separated from that due to native ability, motivation, restrictionism, family socioeconomic status, and other factors (22%) before the rate of return is computed (Welch, 1974).

As indicated earlier, one cannot merely subtract the sum of the values of resources expended from the values of the products of college education represented by differential earnings in each expected year of life because resources are used at different times during the period of investment, and earnings are not only realized at different times, but the value of a given level of earnings during the early years following graduation greatly exceeds the value of equal earnings later in life. As a final step therefore, the computer discounts the costs of resources expended and the differing earnings until the discounted value of costs is equal to the discounted value of earnings, and reports this discount rate as the rate of return (Witmer, 1975).

3. Has college productivity been declining?

The annual rate of return on social investment in the college education of men declined from 13.3% in 1939 to 11.4% in 1949, the earliest years for which comprehensive computations have been made (Becker, 1964).

The following Figure 1 displays the results of computations of rates of return on social investments in college education for men in the years 1956 through 1972, for which comprehensive cost (American Council on Education, 1975, and U.S. Office of Education, 1975) and earnings data (U.S. Bureau of the Census, 1974) are available:

Figure 1. ANNUAL RATES OF RETURN ON SOCIAL INVESTMENTS IN COLLEGE EDUCATION FOR MEN, 1939-1972

Year* (A)	Social Costs** (in 1972 dollars) (B)	Lifetime Earnings** (in thousands of 1972 dollars) High School graduates (C)	College graduates (D)	Difference (D-C=E)	Annual Rates of Return** (F)
1939	--	$202	$316	$114	13.3%
1949	--	261	423	162	11.4
1956	$10,495	306	479	173	17.2
1958	11,496	292	490	198	16.5
1961	12,074	315	505	190	16.6
1963	13,019	336	527	191	16.2
1964	13,161	340	529	189	16.1
1966	14,357	364	581	217	15.7
1967	15,003	355	564	209	15.3
1968	15,235	369	607	238	16.3
1969	15,040	378	617	239	15.3
1970	15,489	371	603	232	14.9
1971	15,315	372	609	237	15.5
1972	15,873	393	627	234	15.2

* Year of high school graduation and college entry.

** The relationships among the costs, earnings, and rates of return are not fixed because of fluctuations in the timing of expenditures, the timing of economic growth, and in the timing of earnings.

Clearly the golden age of higher education did not come to an abrupt end at the outset of the 1970s! The 1971 rate of return was higher than that of 1969. The rate of return fell only one-tenth of one percentage

point between 1967 and 1972. While the earnings gap between male college and male high school graduates ages 25 to 34 narrowed during the period 1970-1972, the gap widened substantially for those ages 35 to 64 so that lifetime earnings and rates of return on investment were both somewhat higher in 1972 than in 1970 even though costs were up almost 2.5%.

Data describing the earnings experiences of women with different levels of education at different ages, though not as complete as that describing the experiences of men, are available for the period 1967 through 1974 from the United States Bureau of the Census (1967-74). The following Figure 2 displays the results of computations of rates of return on social investments in college education for women.

Figure 2. ANNUAL RATES OF RETURN ON SOCIAL INVESTMENTS IN COLLEGE EDUCATION FOR WOMEN, 1964-1974

Year* (A)	Social Costs** (in 1972 dollars) (B)	Lifetime Earnings** (in thousands of 1972 dollars) High school graduates (C)	College graduates (D)	Difference (D-C=E)	Annual Rates of Return (F)
1964	$12,346	$329	$480	$151	19.8%
1967	13,380	303	443	140	14.5
1968	13,647	323	465	142	14.3
1969	13,916	292	437	145	14.3
1970	14,095	312	461	149	14.7
1971	13,942	312	463	151	15.1
1972	14,286	318	471	153	14.6
1973	13,159	320	475	155	15.5
1974	13,249	323	480	157	15.6

* Year of high school graduation and college entry.

** The relationships among costs, earnings, and rates of return are not fixed because of fluctuations in the timing of expenditures, the timing of economic growth, and in the timing of earnings.

The annual rate of return on social investment in the college education of women declined from a high of 19.8% in 1964, the earliest year for which a comprehensive computation has been made (Witmer, 1971A) to a low of 14.3% in 1969, and regained the higher rate of 15.6% for students graduating from high school and entering college in 1974. There was no abrupt downward shift at the outset of the 1970s.

The annual rates of return on private investment in the college education of men range from a high of 17.2% in 1890 to a low of 10.7% in 1929 and have been somewhat lower than those on social investment since 1949. The annual rates of return on private investment in the college education of women range from a low of 8.5% in 1919 to a high of 25.7% in 1964 (Witmer, 1971B). These rates of return contrast sharply with the annual rates of 10% realized on business investments, and constitute a strong argument for a public policy of maintaining low costs to students while increasing government support of both privately and publicly controlled colleges.

Rate of return analyses indicate where investment opportunities exist. Theoretically, successive investments where rates of return are high should eventuate in equal rates of return on investments in all alternatives. There are, however, at least five reasons why the rates of return on investments in college education have not declined to the level of returns on business investments, nor stabilized at a uniform rate, despite prodigious increases in college enrollment since the turn of the century.

(1) Market imperfections persist. Knowledge of costs and earnings is not universal, restriction on entry to fields of study like medicine continues, access to college is very limited in some places, student financial aid programs are not fully funded, etc.

(2) There is great variability in the value of different major programs of study. Note, for example, the results of research undertaken in 1967 and 1968 which are displayed in Figure 3. As the needs of society change, the programs, enrollments, costs, earnings, and rates of return change, frequently beyond the view of distant observers who erroneously consider college education to be a unitary product. Shifts to higher value programs are undoubtedly the most important element in promoting the continuation of high levels of college productivity and related high rates of return (Witmer, 1975).

Figure 3. ANNUAL RATES OF RETURN ON PRIVATE INVESTMENT IN SELECTED PROGRAMS OF COLLEGE EDUCATION FOR MEN

	Low part of range		High part of range	
Investigator (A)	Program (B)	Rate of Return (C)	Program (D)	Rate of Return (E)
Craft (1968)	Architecture	8.5%	Veterinary Medicine	19.8%
Stager (1968)	Education	7.3%	Dentistry	23.7%
Khanna and Bottomley (1969)	Mechanical Engineering	9.5%	Statistics	15.0%
Witmer (1971A)	Agronomy	10.4%	Mineral Engineering	22.5%

(3) College experience provides education in the efficient use of factors of production. Not only does it increase the value of one factor of production, labor, but it promotes effectiveness in the introduction and combination of other factors (Welch, 1970).

(4) College experience also promotes efficiency in consumption as buying decisions become more complex in a technologically advancing environment (David and Morrall, 1974).

(5) A final reason why rates of return on investments in college education have not greatly declined during the past seventy years is that as colleges grow in response to student demand, they realize substantial economies of scale.

Predictions of glut in the market for college graduates, and decline in the productivity of colleges, have persisted since World War II (Kotsching, 1943). Well managed colleges, however, which have been responsive to the society which founded and sustains them, have maintained high levels of productivity.

4. Is college productivity declining?

We don't know as much about the period 1973-1977 as we know about 1972 and the years preceding because our knowledge, though more immediate, is less comprehensive and will remain so, until the results of national data collection are published. In the meantime, the following significant changes are discernible:

a. Annual faculty salary increases are lagging five and one-half points below the rate of consumer price inflation.

b. Increases in the prices of all goods and services purchased by colleges and universities are lagging two and one-half points below the annual rate of increase in consumer prices generally.

c. State support of colleges and universities is lagging two and one-half points below annual price increases, as many state governments expect institutions with a stable funding base to serve growing numbers of students.

d. The capital outlay of colleges is decreasing 15% per year.

e. Although the published fee schedules of colleges report annual average rate increases ranging from 4.5% at publicly controlled universities to 9.0% at publicly controlled 2-year colleges, actual constant dollar tuition and other fee income per student is declining 2.3% per year.

f. As higher than expected proportions of the young elect higher education, college enrollments are growing at the rate of 9.9% per year and are driving the constant dollar costs per student down 4.6% per year.

g. Annual student earnings foregone are down 1.4% as the rate of unemployment of high school graduates ages 18 to 24 stands at 19.7%.

h. Starting salaries of college graduates are increasing about 4 to 8% per year.

i. After faltering and declining for two years, the national economy is resuming real growth at an annual rate of 6.5% and the consumer price inflation rate is declining to an annual rate of 5.5%.

j. The average constant dollar value of college education is increasing 1.7% per year as shifts to highly valued programs of study continue and unemployment rates of college graduates decline to 2.9% compared with the 9.1% of high school graduates.

Computations which incorporate these changes, and continue the values of all other costs and benefits unchanged, indicate that the rate of return on social investments in college education is now 15.5% annually up slightly

from 15.2% in 1972. Investments in the research and public service activities of colleges are stable. We conclude that the productivity of colleges is not declining.

5. Will college productivity decline?

In looking to the future we shift from knowledge to belief. We nonetheless make predictions on the basis of what we know about the present and the past. We know that nature is not totally erratic, capricious, nor unpredictable. We assume, as do all who practice predicting science, that change is possible, but usually takes place slowly. We expect the same causes to have the same effects. We expect the current, complex trends to continue and, by projection, can make the following tentative predictions concerning the productivity of higher education from 1978 through 2000.

During the period 1978-1982, legislators in state capitals and in Washington, D.C. will probably provide very little real additional funding for higher education because of misconceptions concerning the college job market and the meaning of declining birth rates. Tuition and expenditures per student in private colleges are expected to continue to rise, but less rapidly than personal disposable income. Despite enrollment limits in scattered places, the total number of college students in the United States is expected to reach new high levels. Constant dollar costs per student will probably decline further. Unprecedented numbers of college graduates will undoubtedly continue to have a substantial earnings edge over high school graduates and the annual rate of return on direct social investments in college education can be expected to approach 17%.

Total enrollments in higher education will probably decline somewhat during the period 1983-1992 despite growing percentages of college students

over age 22. As the average age of college graduates rises, the period during which increased earnings are realized will be considerably shortened. A larger share of expenditures for an older student body will be rightfully assignable to immediate consumption rather than to investment. Older students may induce modest increases in government funded student financial aids, while unionized faculties, bargaining collectively, will surely gain somewhat higher levels of salary and support funds for college education. During this period employers may perceive, and the market may reflect, some of the quality declines in college education brought on by failures to increase funding to match increased enrollments during the late 1970s and early 1980s. If these assumptions are correct the annual rate of return on social investments in college education may be driven as low as 11%--only slightly higher than the rate of return on business investments in physical capital.

By the year 2000, the college degree will undoubtedly be required at the threshold of the same good employment as is the high school diploma now (Witmer, 1970: 515). Intelligence quotients, on average will have risen another 12 points and the transition to universal access to post-secondary education will probably have been completed. If trends established during the past 85 years continue, the educational upgrading of the population will have brought about many advances in technology and reorganizations of industry to secure higher levels of human productivity. By the year 2000, nearly all occupations will have become more intellectually demanding and, coincidentally, more creative, interesting, and fulfilling. Although the average age at which people retire will have risen, and the length of worklife will have increased, the period of time a person remains in a particular job and the life span of different

occupations will have decreased. Lifelong learning will have become a reality for many, if not most, members of American society.

6. Conclusion

Has productivity of American college education declined since 1969? No, not appreciably! Is it declining? No! Will it decline during the twenty-five years ahead? Yes, probably, but most likely it will recover and, by the year 2000 the annual rate of return on direct social investments in college education may very well reach 19%.

The productivity of colleges during the ultimate quarter of the twentieth century is a very important matter to the faculties and others who depend on colleges for livelihood, to the society which founds and sustains colleges to promote the social welfare, and to the students who seek opportunities for growth in the knowledge, understanding, sensitivity, and creative ability which prepares them for challenging vocational life as well as personal fulfillment. Continuing reports of steep declines in rates of return during the years just ahead could lead many to believe that resource costs are getting too high relative to society's economic valuation of the resulting products. Such beliefs would eventually be expressed through the political system and could very well lead to the abandonment of the goal of access for all qualified persons who seek college education and the enactment of policies which limit access to the elite classes which predominated in the halls of academe prior to World War II. Now is the time to rigorously reexamine comprehensive cost and earnings data; now is the time to recompute the rates of return on investments in college education. While slavish response to signals from the marketplace is evidence of the abdication of higher education's responsibility for providing social leadership, witting blindness to such signals is evidence of extreme arrogance.

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